

## PRESENCE WATCHER PROXY

## Background of the Invention

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The present invention pertains to communication networks and more particularly to a method for optimizing message exchanges for presence information.

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Presence may mean that a user is there or not there. A user's presence status could be available for family members, or their boss, but do not disturb for the general public. Presence information may also include information about what methods of communication a user is open to or available to. For example, a common wireless phone may be available only for voice calls, whereas an office communication system maybe available for voice, text messages or even video capability.

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Presence information is currently implemented in the various instant messenger technologies. It allows entities or users to maintain a passive check on the communication status of other entities or users with whom they may wish to communicate. With the development of session initiation protocol (SIP), the SIP protocol provides a means to communicate presence information. Typically when a user wishes to make its presence known in a network, the user or user agent sends a register message to the network using a SIP message.

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The user's presence information may then be transmitted throughout the network as applicable or needed.

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Accordingly, what is needed is an efficient method for obtaining, collecting and transmitting presence information throughout a communication network.

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### Brief Description of the Drawing

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FIG. 1 is a block diagram of a communication network in accordance with the present invention.

FIG. 2 is a message flow chart pertaining to the block diagram of FIG. 1 in accordance with the present invention.

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FIG. 3 is a block diagram of a communication network with consolidated notification message in accordance with the present invention.

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FIG. 4 is a message flow chart of the communication network of FIG. 3 in accordance with the present invention.

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FIG. 5 is a block diagram of a communication network depicting stored list notification messages in accordance with the present invention.

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FIG. 6 is a message flow chart of the communication network of FIG. 5 in accordance with the present invention.

FIG. 7 is a block diagram of a communication network in which connection is lost in accordance with the present invention.

FIG. 8 is a message flow diagram of the communication network of FIG. 7 in accordance with the present invention.

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#### Description of the Preferred Embodiment

Presence information is defined in very broad terms these days. It includes not only things like on/off hook but it includes different statuses that a user chooses to advertise. Presence information can be customized so that someone can define their presence dependent upon who is asking. For example, a user's status could be available for family members or their boss but "do not disturb" for the general public.

Presence information may also include information about what methods of communication a user is capable of using. For example, voice only, text messaging, video capabilities, etc. For 3G wireless networks presence information is defined as follows. A logical model of the presence information consists of an arbitrary number of elements. Each such element may contain information as:

Status, which may consist of values such as open, closed, online, offline, busy, away, do not disturb, etc.;

Communication address, which may consist of a communication means (example service type or types, media type of types, multimedia/instant messaging service, etc.) and a contact address; and

Other presence information.

The present invention pertains to a presence information proxy which provides for the following functions:

The presence information proxy allows a user agent of a watching entity to provide a single subscription request for a list of entities (buddies);

5 The presence information proxy can consolidate presence information about multiple entities in reply to a user agent; and

10 The presence proxy can retain presence information about multiple entities on behalf of a watcher's user agent even when that watcher's user agent is not available to receive the information (such as in a loss of connection situation). This permits the presence proxy to deliver retained presence information to the watcher without the need to request it again from other entities.

15 Referring now to FIG. 1, a communication network is shown. Presence information allows users to maintain passive checks on the communication state of other users or entities with whom they may wish to communicate (e.g., a buddy list). Session initiation protocol (SIP) provides a means to communicate presence information. Mobile station (user agent) 10 transmits a subscribe request through wireless network 20 to presence proxy 40. The subscribe request 101  
25 enumerates a list of buddies (1-5) about which mobile station 10 desires presence information. Buddies 1-5 comprise mobile station 80, user agents 72, 74, and 76 and mobile station 85 respectively. Presence proxy 40 then transmits two subscribe requests 102 and 103 to  
30 presence agent 60. Subscribe request 102 is a request for presence information concerning mobile station 80 or buddy 1 and subscribe request 103 is a request for presence information concerning mobile station 85, buddy 5. See also FIG. 2.

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Next, presence proxy 40 transmits subscribe requests 104 105 and 106 to presence agent 50 which is part of the internet protocol network 30.

5        Presence agent 50 maintains the presence of user agent 72, 74 and 76. Presence agent 50 is aware of the status of each of the user agents 72, 74 and 76. For example, the status of user agents 72 and 76 would be open to communication and the status of user agent 74  
10        would be access as denied. Presence agent 50 transfers message 109 to presence proxy 40 which indicates that user agent 72 (buddy 2) has accepted communication. Presence agent 50 also transmits message 110 to presence proxy 40 which indicates that user agent 74  
15        has denied acceptance of the communication. Similarly, presence agent 50 transmits message 111 to presence proxy 40 which indicates that user agent 76 has accepted the communication and is providing the appropriate presence information. Presence agents may  
20        respond to subscribe messages with either ok, accept, or denied messages.

      Presence agent 60 maintains the presence state of mobile stations 80 and 85. Presence agent 60 transfers  
25        messages 107 and 108 to presence proxy 40 which indicate that mobile stations 80 and 85 are open and will provide presence status.

      Next, presence proxy 40 transmits message 112 to  
30        mobile station 10. Message 112 indicates that both buddies 1 and 5 (mobile stations 80 and 85) are in an open status. Similarly, presence proxy 40 transmits message 113 to user agent 10 which indicates that buddies 2 and 4 (user agents 72 and 76) have accepted  
35        the communication. Lastly, presence proxy 40 transmits message 114 which indicates that buddy 3 (user agent

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74) has denied communication. The mobile station or user agent 10 has received the presence information of each of the buddies some being internet protocol subscribers and some being other mobile stations. The mobile station 10 was able to request presence information using a single message and received one or more messages containing consolidated responses. This reduces the communication between the presence proxy 40 and the user agent 10 since message overhead is reduced. When user agent 10 is a mobile station with an air interface connection to the presence proxy, this reduction in overhead is a significant savings in bandwidth for the wireless network.

FIGs. 3 and 4 depict a similar scenario to FIGs. 1 and 2, except that messages involved in FIGs. 3 and 4 are notifications that occur after the initial subscription scenario has completed. FIG. 3 is a block diagram of a communication network similar to FIG. 1 while FIG. 4 is a message flow chart embodying the message flow of FIG. 3. Instead of the presence proxy 40 transmitting each of the notify messages 112, 113 and 114 back to user agent 10, presence proxy 14 performs a message consolidation of the notify messages and transmits a single message back to user agent 10. As a prerequisite for the operation of FIGs. 3 and 4, it is assumed that all the messages from 101 through 114 have been sent in a similar fashion as was shown in FIG. 2.

The various presence agents 50 and 60 of FIG. 3 will notify the presence proxy 40 when the state of a buddy has changed. Presence proxy 40 consolidates these individual notify messages into a single message as explained below. In response to the previously sent subscribe request, Presence agent 60 would, for

example, transmit a notify message 120 to presence proxy 40 which indicates that buddy 1 is away from his mobile station 80. In response, presence proxy 40 would transmit an ok message 121 which is an  
5 acknowledgment back to presence agent 60. Next, for example, present agent 50 transmits a notify message 122 to presence proxy 40. This notify message 122 indicates that user agent 72 has closed his internet device (computer) and is no longer receiving or  
10 transmitting. In response, presence proxy 40 transmits another ok message 123 to presence agent 50 which acknowledges notify message 122.

Then, for example, presence agent 60 transmits a  
15 notify message 124 to presence proxy 40. This message indicates that buddy 5, mobile station 85, is open for communication.

Presence proxy 40 responds with another ok or  
20 acknowledge message 125 to presence agent 60.

Presence proxy 40 then consolidates the individual notify messages 120, 122 and 124 into a single notify message 126. In this example, presence proxy 40 has  
25 determined that it is time to send a consolidated notify message 126 to user agent 10 based on a timeout or another equivalent mechanism. Presence proxy 40 then transmits notify message 126 to user agent 10. Notify message 126 includes the status that buddy 1,  
30 mobile unit 80, was away from the mobile unit; buddy 2, user agent 72 was closed for communication; and buddy 5, mobile unit 85, was open for communication. User agent 10 then responds by transmitting an ok or acknowledge message 127 to presence proxy 40.

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As can be seen from FIG. 4, only one notify message 126 is returned to user agent 10 whereas in FIG. 2, three notification messages were transmitted, 112 through 114. As a result, the valuable air time required was cut by two-thirds from the scenario of FIG 2.

The scenario of FIGs. 5 and 6 is a list subscription whereby the presence proxy 40 keeps a list of the buddies for user agent 10, for example. User agent 10 transmits a subscribe message 140 to presence proxy 40. Presence proxy 40 keeps a list of user agent 10 buddies for the list of buddies indicated by the subscribe message 140. Presence proxy 40 determines that the buddies at mobile stations 80 and 85 and user agent 74 are to be contacted for their presence information.

Presence proxy 40 then generates a subscribe message 141 and transmits this message to presence agent 60 which maintains mobile unit 80 (buddy 1). Further, presence proxy transmits subscribe message 142 to presence agent 60 for obtaining presence information about mobile station 85 (buddy 2). Lastly, presence proxy 40 generates subscribe message 143 and transmits it to presence agent 50 through internet network 30. As a result, one subscribe message by user agent 10 has produced several subscribe messages 141-143, each transmitted to the appropriate presence agent for maintaining the particular user agent or buddy.

Presence agent 60 in response to subscribe message 141 transmits ok message 144 to presence proxy 40 which indicates that mobile station 80 is open. Similarly, in response to subscribe message 142, presence agent 60 transmits ok message 145 to presence proxy 40 which



indicates that mobile unit 85 or buddy 2 is open.  
Next, presence agent 50 transmits through the internet  
network 30 message 146 to presence proxy 40. Message  
146 indicates that access to buddy 2 user agent 74 is  
5 denied.

Presence proxy 40 then transmits ok message 147  
which indicates that mobile units 80 and 85 are open  
for communication to user agent 10. Presence proxy 40  
10 then also transmits message 148 to user agent 10.  
Message 148 indicates that access to user agent 74 is  
denied.

As can be seen, a single subscribe request by user  
15 agent 10 has generated multiple subscribe messages  
according to a predefined buddy list stored within  
presence proxy 40. Mobile station 10 may have several  
such stored lists and select from a number of them.

The scenario of FIGs. 7 and 8 is that user agent  
20 10 is losing connection to the network as in the case  
of a wireless network such as network 20 where mobile  
unit 10 may periodically lose connections. As a  
prerequisite to the scenario figures, FIGs. 7 and 8, it  
25 is assumed that user agent 10 has previously requested  
a presence subscription that included mobile station 80  
(buddy 1) and received a response that he will be  
provided with presence information.

User agent 10 loses or drops access 150 to SIP  
30 presence proxy 40. Notify message 160 concerning the  
open status of mobile unit 80 is transmitted from  
presence agent 60 to presence proxy 40. An ok  
acknowledge message 161 is transmitted back to presence  
35 agent 60 from presence proxy 40.

Next, presence proxy 40 transmits a notify message 162 to user agent 10 indicating that mobile unit 80 has an open status for communication. However, user agent 10 has lost his connection 150 to presence proxy 40.

- 5 In this case, since the connection between presence proxy 40 and the user agent 10 has been lost 150, no ok message is received back by presence proxy 40.

- 10 At some point user agent 10 is again able to communicate 170 with presence proxy 40. When communication is restored 170, user agent 10 renews its request for subscriptions and includes an additional request for presence subscription to a new buddy, user agent 78. An alternative would be for the presence proxy to detect the loss and re-establishment of communication and then deliver updated presence information to the user agent. As a result, subscribe message 163 is transmitted by user agent 10 to presence proxy 40.

- 15 20 Presence proxy 40 then transmits subscribe message 164 to presence agent 50 for the status of user agent 78 (the new buddy). Presence agent 50 responds with an ok message 165 that indicates that user agent 78 is open for communication. Presence proxy 40 then transmits an ok message 166 indicating that the status of mobile unit 80 and user agent 78 is open for communication.

- 30 When presence proxy 40 does not receive an acknowledge from a previously sent notify message, presence proxy 40 stores the status of the notify message so that it may be retransmitted when communication is again reestablished with the user agent 10. This not only prevents the loss of presence information which has been requested by user agent 10
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but also minimizes the message responses received by  
user agent 10 and minimizes the messaging sent to  
presence agents to renew subscriptions and gather  
presence information when communication is restored to  
5 user agent 10.

As can be seen from the above explanation, the  
present invention maintains presence information of  
buddies even when a user agent is not reachable. In  
10 addition, the present invention optimizes the air  
interface in that it consolidates presence information  
from multiple sources; it permits a user to specify a  
list of users in a subscribe message; and it permits a  
user to issue a subscribe message to predefined lists  
15 of users. In addition, the present invention also  
optimizes messaging in non-wireless networks and its  
use is not limited to a wireless environment.

Although the preferred embodiment of the invention  
20 has been illustrated, and that form described in  
detail, it will be readily apparent to those skilled in  
the art that various modifications may be made therein  
without departing from the spirit of the present  
invention or from the scope of the appended claims.

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